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STATION SELECTING SYSTEM

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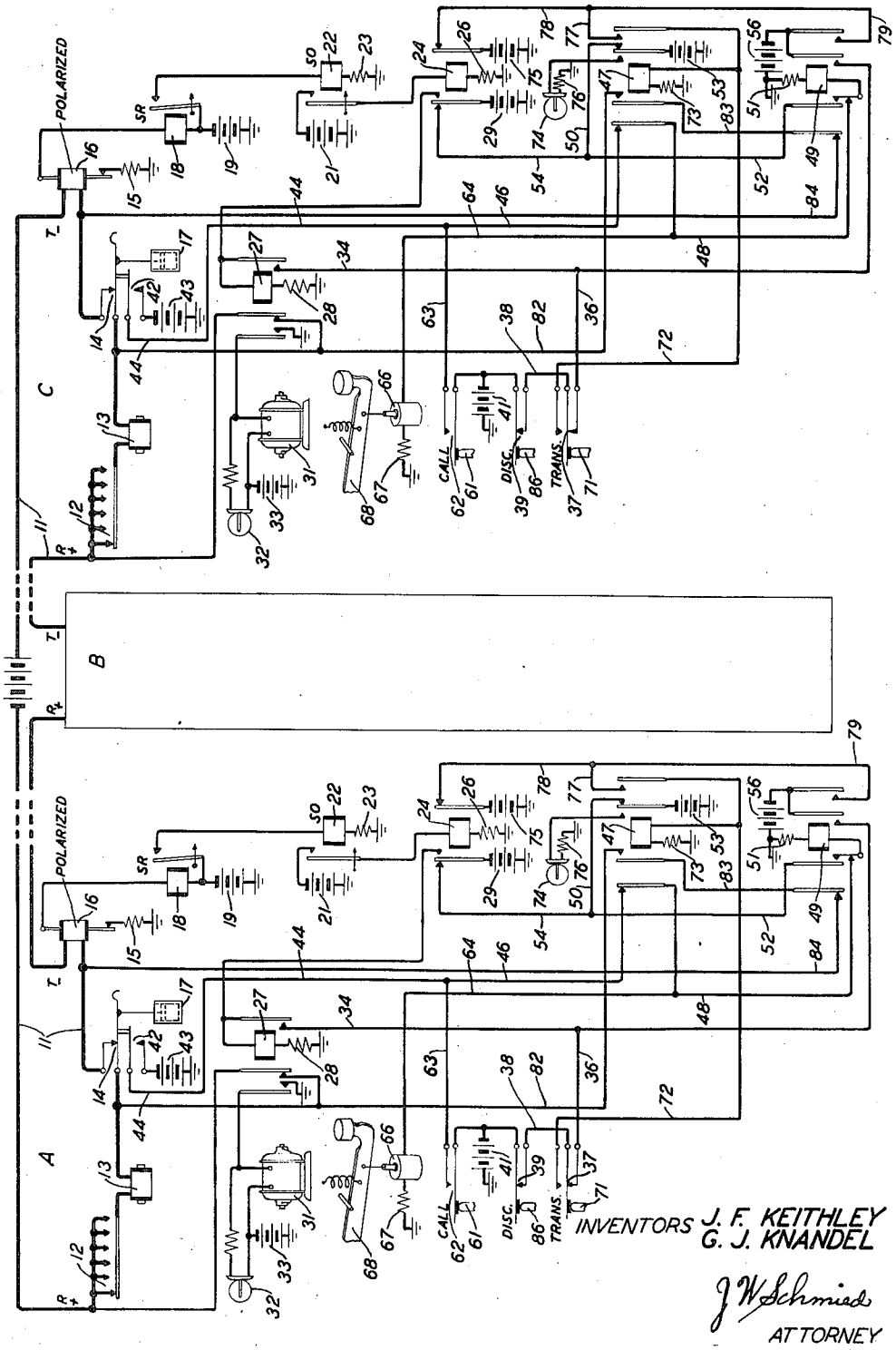

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STATION SELECTING SYSTEM

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This invention relates to telegraph apparatus and systems and particularly to a station selector system for placing two or more stations of a telegraph system including a plurality of stations in intercommunicative condition under the control of any one of the stations.

The invention represents an improvement over station selector systems heretofore known and particularly of the type shown in Patent 2,152,010, granted March 28, 1939, to W. J. Zenner.

According to the disclosure of the Zenner patent each of a plurality of stations on a telegraph line is provided with a key for opening the line circuit for a predetermined minimum interval of time and each station responds to the opening of the line circuit by the starting of the operating motor of the printing telegraph set at that station. The attendant at the station at which the motor starting function was initiated then transmits the call signal of the calling station which is recorded at all of the stations and which is effective at the calling station to condition the motor starting apparatus to remain operated, and thereafter transmits the call signal or signals of the called station or stations, which are recorded at all stations and which condition the motor starting apparatus to remain operated at the respective called stations. Thereafter the attendant transmits a common disabling signal which is effective at all uncalled stations to shut down the operating motor and to disable the transmitter and the call initiating line circuit keys, but the selector magnets at the uncalled station remain under the control of the telegraph line and chatter in response to signals not intended for those stations.

An object of the present invention is to enable a station to distinguish with certainty between an open line circuit condition incident to the initiation of a call and an open circuit condition occurring incident to normal signal transmission or fortuitously.

Another object of the invention is to condition a calling station to remain in operation as an incident to the initiation of a call and without necessitating the transmission of the call signal of that station.

A further object of the invention is to isolate completely the signal transmitting and signal receiving apparatus of an uncalled station from control of or control by the communication line circuit.

In accordance with the preferred embodiment of the invention, each of the stations associated with a telegraph line circuit has, in addition to the transmitting contacts and selector magnets or line relay, a pair of normally closed contacts which, upon being opened, requires an interval representing a considerable number of permutation code combinations to close, and an instantaneously responsive relay, all of these elements being included in the line circuit. The relay controls a normally energized relay which is slow to release, the release time being longer than one permutation code combination, but considerably shorter than the interval required for the normally closed contacts in the line circuit to close after being opened. The slow-release relay, upon releasing, controls the energization of a very slow-operating relay which is timed to operate just before the line circuit contacts reclose under the control of their retarding device. The slow-operating relay at each station operates to effect the energization of a relay which completes the circuit for the operating motor at the station, and the motor control relay remains energized over a provisional holding circuit. Each of the normally closed line circuit contacts has ganged thereto a pair of normally open contacts which, upon the opening of the line circuit contacts at a station, become closed to establish, at that station only, a holding circuit for the motor control relay in parallel with the provisional holding circuit.

Following the reclosure of the line circuit at the calling station, the attendant transmits one or more code combinations representing one or more stations being called. At those stations to which the transmitted calling code signals are assigned, contacts controlled by the selector mechanisms are closed to control the establishment of holding circuits for their motor control relays in parallel with the provisional holding circuits. All of the stations record all of the station selecting codes but those not represented by the calling codes do not establish additional holding circuits for their motor control relays. Following the transmission of the station selecting code or codes, the calling station transmits a cut-off code. All of the stations record this code and at all stations the provisional holding circuit for the motor control relay is interrupted. At the calling and called stations the supplementary holding circuits maintain those relays operated to hold their stations in operative condition but at the uncalled stations the motor control relays are released and the stations are shut down. Incident to the shutting down of the uncalled stations their

transmitters, recorders and normally closed line contacts are shunted out of the line circuit so that they can neither transmit nor respond to signals.

For a complete understanding of the invention reference may be had to the following detailed description to be interpreted in the light of the accompanying drawing in which the single figure is a schematic circuit view showing three stations in accordance with the present invention associated with a telegraph line circuit, two stations being shown in full detail, and a third being represented symbolically.

Referring now to the drawing, the letters A, B and C represent three stations associated with a telegraph line. It will be understood that as many more stations as desired up to the number of calling codes available, say 26, may be included in the line circuit and other stations may be operatively associated with the line circuit shown through suitable repeaters. The line circuit is indicated by the reference numeral 11 and at each of the stations A, B and C, the line circuit includes permutation code transmitting contacts 12, recording printer selector magnet, or line relay (shown as magnet) 13, normally closed line circuit contacts 14 and a relay 16. The transmitting contacts 12 may be either keyboard controlled or tape controlled. The normally closed contacts 14 are arranged to be opened manually, and apparatus is provided to delay the closure of these contacts for an interval representing a considerable number of permutation code combinations. The delaying mechanism may be a spring driven governed mechanical device such as a clockwork mechanism, or may be a dashpot mechanism as indicated by the reference numeral 17.

The purpose of the delaying device 17 is to prolong the open condition of contacts 14 beyond any interval of open line condition likely to be encountered in normal signaling and beyond any interval that the line 11 is likely to be fortuitously or accidentally open. In accordance with one embodiment of the invention, the delaying device 17 has been arranged to introduce a delay interval of eight seconds in the closure of contacts 14. In ordinary telegraph transmission, a normal break signal, which is accomplished by opening the line, is usually not longer than two or three seconds duration, so that a delay of eight seconds would be ample to guard against operation of the station selecting mechanism in response to any signaling condition impressed upon the line 11 other than by the contact 14.

As previously stated, the signaling line 11 includes at each station a relay 16 which is instantaneously responsive to signaling conditions in the line and which is energized when the line circuit 11 is closed to hold its armature in engagement with its front contact. The front contact of relay 16 is connected through resistor 15 to ground and the armature of relay 16 is connected to one terminal of the winding of a slow-release relay 18, the other terminal of which is connected to grounded battery 19. Since relay 16 is energized when the line 11 is in the steady marking condition, it holds the relay 18 energized and the relay 18 has no front contact. The retardation in the release of relay 18 is sufficient to prevent the relay from responding to the operation of instantaneously responsive relay 16 as it follows signaling conditions in the line 11. The relay 18 will release only after the relay 16 has remained deenergized for an interval substantially greater than the longest spacing signal normally encountered during the signaling.

The armature of relay 18 is connected to grounded battery 19 and the back contact of the relay is connected to one terminal of a very slow operating relay 22, the other terminal of which is connected through resistor 23 to ground. The interval which the relay 22 requires to operate is such that when the line contacts 14 enter into their restoring cycle under the control of delaying device 17 the relay 22 will be operated just before the contacts 14 reclose. In accordance with one embodiment of the invention the characteristic of relay 22 is such that an interval of about six seconds intervenes between the closure of the energizing circuit of relay 22 and the operation of its armature. Since, as previously stated, in this embodiment of the invention the delaying device 17 is arranged to introduce a delay interval of about eight seconds in the closure of contact 14, it will follow that the releasing time for slow-release relay 18 is somewhat less than two seconds.

The front contact of relay 22 is connected to grounded battery 21 and the armature is connected to one terminal of the winding of relay 24, the other terminal of which is connected through resistor 26 to ground. The left-hand armature of relay 24 is operable between a back and a front contact and the front contact is connected to one terminal of the winding of relay 27, the other terminal of which is connected through resistor 28 to ground. The left-hand armature of relay 24 is connected to grounded battery 29. The outer left-hand armature of relay 27 cooperates with a grounded front contact and the armature is connected to one terminal of an operating motor 31 for the printing telegraph set and to one terminal of an indicator lamp 32. The other terminal of motor 31 and lamp 32 is connected to grounded battery 33 which serves as a source of power for the motor and the lamp.

The inner left-hand armature of relay 27 cooperates with a back contact only and is connected to that side of the transmitting contacts 12 which is remote from selector magnet 13. The back contact with which the inner left-hand armature of relay 27 cooperates is connected to that side of selector magnet 13 of the printing telegraph set which is remote from transmitting contacts 12. When the relay 27 is in deenergized condition, the inner left-hand armature and back contact establish a shunt across the selector magnet 13 and transmitting contacts 12 so that the selector magnet 13 will be incapable of responding to signals on the telegraph line 11 and the transmitting contacts 12 will be incapable of impressing signals on the telegraph line. The right-hand armature and front contact of relay 27 establishes a provisional holding circuit for the relay from grounded resistor 28 through the winding of relay 27, front contact and right-hand armature of the relay, conductors 34 and 36, normally engaged lower and middle springs of a set of contact springs 37, conductor 38 and normally closed contact springs 39 to grounded battery 41.

Ganged to the normally closed pair of contacts 14 so as to be closed when the contacts 14 are opened, is a pair of normally open contacts 42, one of which is connected to grounded battery 43 and the other of which is connected through conductor 44, conductor 46, outer left-hand armature and back contact of relay 47, conductor 48, fixed contact and movable make-before-break

front contact controlled by the inner left-hand armature of relay 49, and winding of relay 49 through resistor 51 to ground.

Upon the opening of contacts 14 manually at station A, for example, the contacts 42 at that station are closed to complete the energizing circuit for the relay 49. When the relay 49 becomes energized, its inner left-hand armature engages the movable front contact before that contact is disengaged from the stationary contact and completes a holding circuit for the relay 49 from ground through the resistor 51, winding of relay 49, movable front contact and inner left-hand armature of the relay, conductor 52, conductor 50, inner right-hand back contact and armature of relay 47 to grounded battery 53 and in parallel therewith through conductor 54 and left-hand back contact and armature of relay 24 to grounded battery 29.

When the normally closed contacts 14 are opened manually the relay 16 responds instantaneously to the open or spacing condition of telegraph line 11 and releases its armature, thus interrupting the energizing circuit for the slow-release relay 18. The closure of contacts 42 accompanies the opening of contacts 14 whereby the energizing circuit for relay 49 is completed and the relay becomes energized and held through its make-before-break contact associated with the inner left-hand armature to the battery connections provided in parallel as above described. Since the relay 16 at each station is included in the line 11, those relays release and interrupt the energizing circuits for their slow-release relays 18 so that this operation occurs at the stations B and C. The relays 49 at the stations B and C do not become energized at this time because the contacts 42 have been operated only at the station A. At each of the stations on the line 11 the slow-release relay 18 completes the energizing circuit for the relay 22 and the relay 22 becomes energized just before the contacts 14 at station A reclose if those contacts have been permitted to enter their restoration cycle immediately upon being opened and have not been held manually for an appreciable interval. It will be understood that if the contacts 14 are held open manually for an interval, the relay 22 at each station will become energized a correspondingly greater interval before the reclosure of contacts 14 than if the contacts 14 had been released from manual control immediately upon moving them to their fully open position. This will have no undesirable effect since it is necessary only that a minimum delay interval before the reclosure of contacts 14 be provided and this minimum delay is afforded by the delay device 17.

The momentary operation of relay 22 at each station results in completion of the energizing circuit for relay 24 which becomes momentarily energized and at its left-hand armature removes one of the holding circuit battery connections for the relay 49 and completes the energizing circuit for the relay 27 which becomes held over the provisional holding circuit including the contacts 37 and 39 at all stations and over an additional holding circuit afforded by the inner right-hand armature and front contact of relay 49 and grounded battery 56 at station A due to the fact that that relay is now energized. The relay 27 starts the motor 31 and lights the lamp 32 at each station by means of its outer left-hand armature and front contact and removes the shunt across the selector magnet and transmitting contacts at each station by means of its inner left-hand armature and back contact so that all of the stations on line 11 are now in operation and are conditioned to respond to permutation code signals on the telegraph line 11 and to impress signals on that line by their transmitting contacts 12.

Following the reclosure of the contacts 14 the telegraph line 11 is in condition for the transmission of signals indicative of the station or stations to be selected for participation in intercommunication. Since station A has been assumed to be the calling station, it is assumed that station A will transmit the station selecting signals. Accordingly, the attendant at station A operates transmitting contacts 12, as by operation of a keyboard transmitter mechanism, to transmit a signal to select a station which, for the present purposes, will be assumed to be the station C. It should be noted that at all of the stations the relays 22 and 24 become deenergized and the slow-release relay 18 became energized following the reclosure of contacts 14. Thus the relays 24 at all stations are deenergized and the motor controlling relays 27 are held energized by their holding circuits.

All of the stations respond to the call signal by recording the character corresponding to the code, and the station C responds to its call signal by selecting a selectable member 61 which is operated to close momentarily the normally open contacts 62. One of the contacts 62 is connected to grounded battery 41 and the other is connected over conductor 63 and then over the previously traced path including conductor 46, outer left-hand armature and back contact of relay 47, conductor 48, stationary contact and movable front contact controlled in make-before-break manner by the inner left-hand armature of relay 49, winding of relay 49 and resistor 51 to ground. Thus the relay 49 at station C becomes energized in response to the closure of contacts 62 and a holding circuit for that relay is established in the same manner as in the previous description of the energization of relay 49 at station A. At no other station does the relay 49 become energized in response to the transmission of the call signal for the station C since the selectable member 61 at other stations is not responsive to that code, but is responsive only to the call signal of the station with which it is associated. The provision of the contacts 42 operated in conjunction with the opening of the contacts 14 eliminates the necessity for a calling station to transmit its own code in order to effect the energization of its relay 49, since that relay becomes energized directly through a circuit completed by the contacts 42.

At each of the stations there is a conductive path branching from the conductor 48 and including the conductor 64, winding of an electromagnet 66 and resistor 67 to ground. At each of the stations the electromagnet 67 has its armature connected mechanically to one of the key levers 68 of the keyboard transmitter mechanism at that station and the key lever is a different one at each station for effecting the transmission of different codes from the stations. Upon the energization of the relay 49 at any station, whether by operation of the contacts 42 or by operation of the selector controlled contacts 62, the branch circuit including the electromagnet 66 is also completed to effect the energization of the magnet 66 and the operation of its associated key lever. In the case of oper-

ation of the magnet 66 through the contacts 42 in connection with the initiation of a call the operation of the keyboard transmitter does not result in the transmission of a code signal on the telegraph line 11 because the line is then open at the contacts 14 and the relay 27 has not yet become energized so that the shunt across the transmitting contacts provided by its inner left-hand armature and back contact is complete. When the operation of magnet 66 is effected through the contacts 62, as in the presently contemplated case of station C, the telegraph line is at this time closed and the shunt across the transmitting contacts has been removed, so that a signaling code particular to the station C and serving as an answer-back is impressed upon the telegraph line 11. This answer-back code operates the telegraph recorders at all stations on the line including the station C, since the motors 31 at all of the stations are in operation and the shunt around the selector magnet at each of those stations is open at the inner left-hand armature and back contact of relay 27. The response of the receiving printer at the station A to the answer-back code transmitted from the station C indicates to the attendant at station A that station C is in readiness to receive telegraph signals. If the answer-back code is the same as the calling code for any station, a large number of stations, as for example 26, may be accommodated by the system, whereas if each station has different call and answer-back codes, such as C for being called and D for answer-back, the number of stations that may be accommodated is reduced, since a code may not serve as the call for one station and the answer-back for another, otherwise the answer-back signal would select the station having that code as its call.

Following the receipt of the answer-back signal from station C the next step is to disqualify all other stations from participating in the intercommunication between stations A and C. This is accomplished by the operation of the transmitter 12 at station A to transmit a signaling code to which the selectable members 71 at all of the stations in the system are responsive. The selectable member 71 engages the middle of the three contact springs 37 to move the middle spring out of engagement with the lower spring and into engagement with the upper spring, the disengagement of the middle spring from the lower spring and the engagement with the upper spring being momentary, after which the middle spring returns to engagement with the lower spring. The disengagement of the middle spring from the lower spring interrupts the provisional holding circuit for the motor control relays 27 at all stations. Since a supplemental holding circuit for the relays 27 at the stations A and C has been established by the inner right-hand armature and front contact of the relays 49, the relays 27 at those stations will not be released but at all other stations, where only the provisional holding circuit is holding the relays 27 energized, the relays will be released to open the circuits of motor 31 and lamp 32 at those stations and to restore the shunt across transmitting contacts 12 and selector magnet 13.

The engagement of the middle contact 37 with the upper contact results in the completion of a circuit from battery 41 through normally closed contacts 33, conductor 38, middle and upper contacts 37, conductor 72, winding of relay 47 and resistor 73 to ground. Thus, the relay 47 becomes energized at each station. At its outer left-hand armature and back contact, the conductive path leading over conductors 46 and 48 to the stationary contact associated with the movable front contact controlled by the inner left-hand armature of the relay 49 is interrupted so that at those stations which have been excluded from intercommunication by the shutting down of their motors the deenergized relays 49 cannot become energized in response to signals occurring in the message to which the selectable members 61 at those stations are responsive, even if the motors at those stations should be restarted unauthorizedly by attendants at those stations through tampering with the apparatus and, more importantly, so that the relays 49 cannot become energized at the excluded stations through the operation by attendants at those stations of call initiating contacts 14 and 42, it being remembered that the relays 49 at each station are normally energizable by operation of the manually operable contacts 42 as well as by the signal responsive contacts 62. At the stations A and C, the opening of the conductive path at the outer left-hand armature and back contact of relay 47 has no effect because that path is open at the stationary one of the make-before-break contacts of relay 49 due to the fact that the relay is held energized by its holding circuit.

At the inner right-hand armature of relay 47, battery connection is transferred from one of the holding circuits for the relay 49 at each station to a busy lamp 74 which has one of its terminals connected to the inner right-hand front contact of relay 47 and the other side connected through resistor 76 to ground. Thus the busy lamp 74 becomes operated at all stations. The interruption of the holding circuit connection to battery 53 has no effect at any of the stations because at the excluded stations the relay 49 has not been energized and no holding circuit has been established and at the participating stations A and C, the parallel holding circuit is maintained at the left-hand armature and back contact of relay 24 which at this time is deenergized.

At the outer right-hand armature and front contact of relay 47 a holding circuit for that relay is established from grounded resistor 73 through the winding of the relay, outer right-hand armature and front contact, conductor 77, conductor 78, and right-hand armature and back contact of relay 24 to grounded battery 75. A parallel and supplemental holding circuit path for the relay 47 extends from the junction of conductors 77 and 78 over conductor 79 through the outer right-hand front contact and armature of relay 49 to grounded battery 56, which supplemental holding circuit is established only at the stations at which the relay 49 is energized which, in the present description is presumed to be the stations A and C.

At the inner left-hand armature and front contact of relay 47, a conductive path is extended from one side of the line opening contacts 14 through conductor 82, inner left-hand front contact and armature of relay 47, conductor 83, to the outer left-hand armature of relay 49. At excluded stations, the relay 49 is deenergized and the outer left-hand armature engages its back contact which is connected by conductor 84 to the other side of contacts 14 at a point on line 11 between the normally closed contacts 14 and the line relay 16, which point is on the remote side of contacts 14 relative to the selector magnet 13.

Thus the shunt which was placed across the transmitting contacts 12 and selector magnet 13 by the deenergized relay 27 at excluded stations, is extended to include the normally closed contacts 14 so that an attendant at an excluded station cannot interfere with signal transmission on the telegraph line 11, nor effect the starting of the motor 31 at that excluded station and all other excluded stations by operation of the normally closed contacts 14.

The system is now conditioned for intercommunication between the stations which have been included for participation in such communication. At those stations the relays 27, 47 and 49 are energized and held through holding circuits, the motors 31 are in operation, the lamps 74 are illuminated to indicate that the telegraph line 11 is in busy condition and the lamps 32 are illuminated to indicate that those stations are included for participation in the message transmission. At excluded stations the relays 47 are energized but the relays 27 and 49 are deenergized and the motors 31 are not operating. The lamps 74 are illuminated at those stations to indicate that telegraph line 11 is in busy condition but the lamps 32 are deenergized to indicate that those stations have been excluded from participation in the message transmission and reception. Message transmission is accomplished by the operation of transmitting contacts 12 and messages are received by the operation of the selector magnets 13. The inclusion in the message material of signals which, in addition to representing characters to be recorded, may also have the function of selecting the selectable members 61 at the several stations, will select the selectable members 61 at the participating stations and cause the closure of contacts 62 but this will have no effect at those stations since the conductive path which extends from the contacts 62 for energizing the relays 49 and, it may be added, the conductive path from the normally open manually operable contacts 42, in parallel with the contacts 62 is interrupted at the outer left-hand armature and back contact of relay 47 which is energized at all stations.

When message transmission has been concluded, any one of the stations which participated in the message transmission may initiate the shutting down of all of the stations, this being accomplished by the opening of the normally closed contacts 14 in the same manner as that employed for starting the station selecting operation. The accompanying closure of normally closed contacts 42 has no effect because relay 47 is energized, thereby opening the energizing circuit of relay 49 at the outer left-hand armature and contact of the relay 47. Just before the reclosure of contacts 14 under the control of delaying device 17, relay 22 operates and completes the energizing circuit for relay 24. At its right-hand armature the relay 24 interrupts the holding circuit for relay 47 at all stations except those which were included in the message transmission. This does not affect the holding circuit for relays 47 established at the outer right-hand armature and front contact of relay 49 at those stations. However, the left-hand armature of relay 24 in moving out of engagement with its back contact interrupts the only holding circuit for the relays 49 at the participating stations that was effective, since the supplemental holding circuit afforded by battery at the left-hand inner armature of relay 47 was interrupted when the relay 47 became energized. Accordingly, the relay 49 releases, and at its outer right-hand armature and front contact interrupts the supplemental holding circuit for the relay 47 which now releases. The relays 49 interrupt the holding circuits for the relays 27 at the participating stations but by this time the left-hand armature of each relay 24 has moved into engagement with its front contact thereby completing the energizing circuits for the relays 27 at all stations so that the motors 31 at the stations which participated in the intercommunication remain in operation and those at the excluded stations are restarted. The release of the relays 47 removes at the excluded stations the shunt across the normally closed contacts 14 and the energization of the relays 27 at those stations removes the shunt across the transmitting contacts 12 and selector magnets 13 so that all stations are now in full communicative condition with respect to telegraph line 11. The system is thus restored to the condition which existed following the reclosure of contacts 14 at the calling station when the station selecting operation was begun, with the exception that none of the relays 49 is energized because the relay 24 at the station which operated the contacts 14 to initiate the shutting down of the stations was held energized by its holding circuit at the time that the contacts 42 were closed and the relay 49 was not released to restore its normal energizing circuit until after contacts 42 had reopened.

As previously stated the provisional holding circuits for the relays 27, through which the relays are at this time held energized, include the normally closed contacts 39. These contacts are controlled by a selectable member 86 which is responsive at all stations to the same signaling code combination, which is a disconnect signal. At this time any station on the telegraph line 11 may transmit the disconnect signal by means of its transmitting contacts 12, but it is assumed that the station which initiated the disconnect operation by the operation of normally closed contacts 14 will transmit the disconnect signal. Accordingly, that station transmits the disconnect signal and at every station on the telegraph line 11 the selectable member 86 is selected and is operated to open momentarily the contacts 39, thus interrupting the holding circuit for the motor control relays 27. These relays release at all stations and interrupt the circuits over which power is supplied to motors 31 and lamps 32 so that the motors stop and the lamps are extinguished. At its left-hand inner armature and back contact the relay 27 at each station restores the shunt across the transmitting contacts 12 and selector magnet 13 and in this way each station is restored to the initial condition with the driving motor idle, both indicator lamps extinguished, and all relays released except the slow-release relay 18 and the line relay 16.

Although a particular embodiment of the invention has been shown in the drawing and described in the accompanying specification, it will be understood that the invention is not limited to such specific embodiment but is capable of modification, rearrangement and substitution of parts and elements without departing from the spirit of the invention and within the scope of the appended claims.

What is claimed is:

1. In a telegraph system, a normally closed communication circuit, a plurality of stations associated with said circuit, a printing telegraph set at each station, a normally disabled operat-

ing motor for each telegraph set, means at each station for interrupting said circuit and for reclosing said circuit after an interval longer than a maximum normal interruption during signaling and longer than fortuitous interruptions, means controlled by said circuit interrupting means and operable just before the reclosing of the circuit for starting the operating motors at all stations, signal controlled means at each station responsive to a signal individual to such station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned and for excluding the printing telegraph set at the station having disabled motor starting means from said communication circuit.

2. In a telegraph system, a normally closed communication circuit, a plurality of stations associated with said circuit, a printing telegraph set at each station, a normally disabled operating motor for each telegraph set, manually operable means at each station for interrupting said circuit, means for controlling and delaying the reclosing of said circuit by said interrupting means for an interval longer than a maximum normal interruption during signaling and longer than fortuitous interruptions, delayedly operable means controlled by said circuit interrupting means for starting the operating motor at all stations just before the reclosing of the circuit under the control of said delaying means, signal controlled means at each station responsive to a signal individual to such station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned and for excluding the printing telegraph set at the stations having disabled motor starting means from said communication circuit.

3. In a telegraph system, a normally closed communication circuit, a plurality of stations associated with said circuit, a printing telegraph set at each station, a normally disabled operating motor for each telegraph set, manually operable means at each station for interrupting said circuit, means for delaying the reclosure of said circuit by said interrupting means for an interval longer than a maximum normal interruption during signaling and longer than fortuitous interruptions, a first operating means controlled by said circuit interrupting means and operable during the operation of said delaying means, a second operating means controlled by said first operating means and operable just before the end of the interval introduced by said delaying means, means controlled by said second operating means for starting the operating motors at all stations, signal controlled means at each station responsive to a signal individual to such station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned and for excluding the printing telegraph sets at the stations having disabled motor starting means from said communication circuit.

4. In a telegraph system, a normally closed communication circuit, a plurality of stations associated with said circuit, a printing telegraph set at each station, a normally disabled operating motor for each telegraph set, means at each station for starting the motor at said stations, slow operating relay means for controlling said motor starting means, relay means included in said circuit at each station and instantaneously responsive to signaling conditions therein for controlling said slow-operating relay means, and means interposed between said slow-operating relay means and said instantaneously responsive relay means for rendering the control of the latter over the former indirect to disqualify said slow-operating relay means from operating on cumulative effects arising out of signal responsive operation of said instantaneously responsive relay means.

5. In a telegraph system, a normally closed communication circuit, a plurality of stations associated with said circuit, a printing telegraph set at each station responsive to equal length permutation code signals, a normally disabled operating motor for each telegraph set, means at each station for interrupting said circuit, means for delaying the reclosure of said circuit by said interrupting means for an interval representing a considerable number of equal length permutation code signals, instantaneously responsive relay means included in said communication circuit at each station, slow-release relay means controlled by said instantaneously responsive relay means requiring an interval exceeding that of one permutation code and less than that introduced by said delaying means to release, slow-operating relay means controlled by said slow-release relay means and operable just before the reclosure of said circuit under the control of said delaying means, means controlled by said slow-operating relay means at each station for starting the operating motor at such station, signal controlled means at each station responsive to a signal individual to such station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned, and for excluding the printing telegraph set at the stations having disabled motor starting means from said communication circuit.

6. In a telegraph system, a normally closed communication circuit, a plurality of stations associated with said circuit, a printing telegraph set at each station, a normally disabled operating motor for each telegraph set, manually operable means at each station for interrupting said circuit, means for delaying the reclosure of said circuit by said interrupting means for an interval corresponding to a considerable number of permutation code signals, a relay in said circuit at each station instantaneously responsive to signaling conditions in said circuit, a slow-release relay controlled by said instantaneously responsive relay requiring an interval to release in excess of that represented by one permutation code signal and less than half of the interval introduced by said delaying means, a slow-operating relay controlled by said slow-release relay and operable just before the end of the interval introduced by said delaying means, means controlled by the slow-operating relay at all stations for starting the operating motors at said stations, signal controlled means at each station responsive to a signal individual to such station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned and for excluding the printing telegraph set at

the stations having disabled motor starting means from said communication circuit.

7. In a telegraph system, a normally closed communication circuit, a plurality of stations each having signal transmitting means and signal responsive means associated with said communication circuit, means normally effective to disable said signal transmitting means and said signal responsive means, a normally disabled operating motor at each station, means at each station for interrupting said circuit and for reclosing said circuit, means controlled by said circuit interrupting means for starting the operating motors at all stations and for rendering said disabling means ineffective whereby to qualify said signal transmitting means and said signal responsive means to be operative, signal controlled means at each station responsive to a signal individual to such station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned whereby the disabling means for said signal transmitting means and said signal responsive means is again rendered effective and for also disabling said circuit interrupting means.

8. In a telegraph system, a normally closed communication circuit, a plurality of stations each having signal transmitting means and signal responsive means associated with said communication circuit, means normally shunting said signal transmitting means and said signal responsive means for rendering them ineffective, a normally disabled operating motor at each station, means at each station for interrupting said communication circuit and for reclosing said circuit, means controlled by said circuit interrupting means for starting the operating motors at all stations and for interrupting said shunting means, signal controlled means at each station responsive to a signal individual to said station for conditioning said motor starting means to remain operated, and means at each station responsive to a common signal for disabling the motor starting means at all stations not so conditioned whereby to reestablish said shunting means and for extending said shunting means to include and disable said circuit interrupting means.

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